

542, 833

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
5 August 2004 (05.08.2004)

PCT

(10) International Publication Number
WO 2004/066389 A2

(51) International Patent Classification⁷: **H01L 27/115,**
21/8247

Robertus, T., F. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656
AA Eindhoven (NL). **SLOTBOOM, Michiel** [NL/NL];
c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(21) International Application Number:
PCT/IB2003/006184

(74) Agent: **DUIJVESTIJN, Adrianus, J.**; Philips Intellectual
Property & Standards, Prof. Holstlaan 6, NL-5656 AA
Eindhoven (NL).

(22) International Filing Date:
16 December 2003 (16.12.2003)

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR,
CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,
MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU,
SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
03100124.1 22 January 2003 (22.01.2003) EP

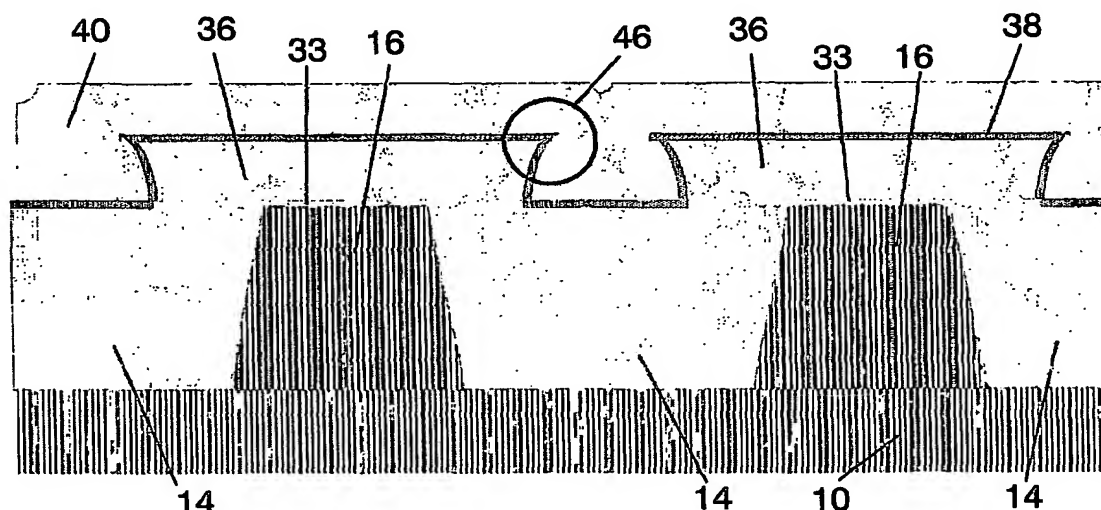
(71) Applicant (*for all designated States except US*): **KONIN-
KLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(84) Designated States (*regional*): ARIPO patent (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,
SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and
(75) Inventors/Applicants (*for US only*): **VAN SCHAIJK,**

[Continued on next page]

(54) Title: IMPROVED FLOATING GATE ISOLATION AND METHOD OF MAKING THE SAME



(57) Abstract: The present invention relates to a method for forming a set of floating gates which are isolated from each other by means of slits, as well as semiconductor devices using the floating gate. The present invention provides a method for manufacturing an array of semiconductor devices on a substrate (10), each device having a floating gate (36), comprising: first forming isolation zones (14) in the substrate (10), thereafter forming a floating gate separator (32) on the isolation zones (14) at locations where separations between adjacent floating gates (36) are to be formed, after forming the floating gate separator (32), forming the floating gates (36) on the substrate (10) between parts of the floating gate separator (32), and thereafter removing the floating gate separator (32) so as to obtain slits in between neighboring floating gates (36). This method has an advantage over prior art in that less residues of floating gate material, or less floating gate material shorts between adjacent floating gates occur. Furthermore, the gate profile is damaged less than in prior art slit processing methods.

WO 2004/066389 A2

**Declaration under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG,*

CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

- *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.